Institute for Nuclear Research and Nuclear Energy

Bulgarian Academy of Sciences

BEOBAL conference

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BEO Moussala Automatic Weather Station and some preliminary results 2004-2006

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Plan:

1. Development of BEO Moussala meteorological system. Main tasks.

2. Sensors. Technical data .

3. Some very preliminary statistics

The history of meteorological measurements on the peak Moussala starts from the beginning of the activity of the state station built in 1932.
Relatively long series of data gives good opportunity for climatic studies. Our work is related with the classic meteorology in its part to study climate change.
Note:
At the first place stays the task to seek for correlation between the meteorological data and the data from other devices on BEO Moussala gas analyzers, gamma background probes, aerosol measuring devices, cosmic rays telescopes .

Vaisala measurements system consists of:

-Data logger QLI50

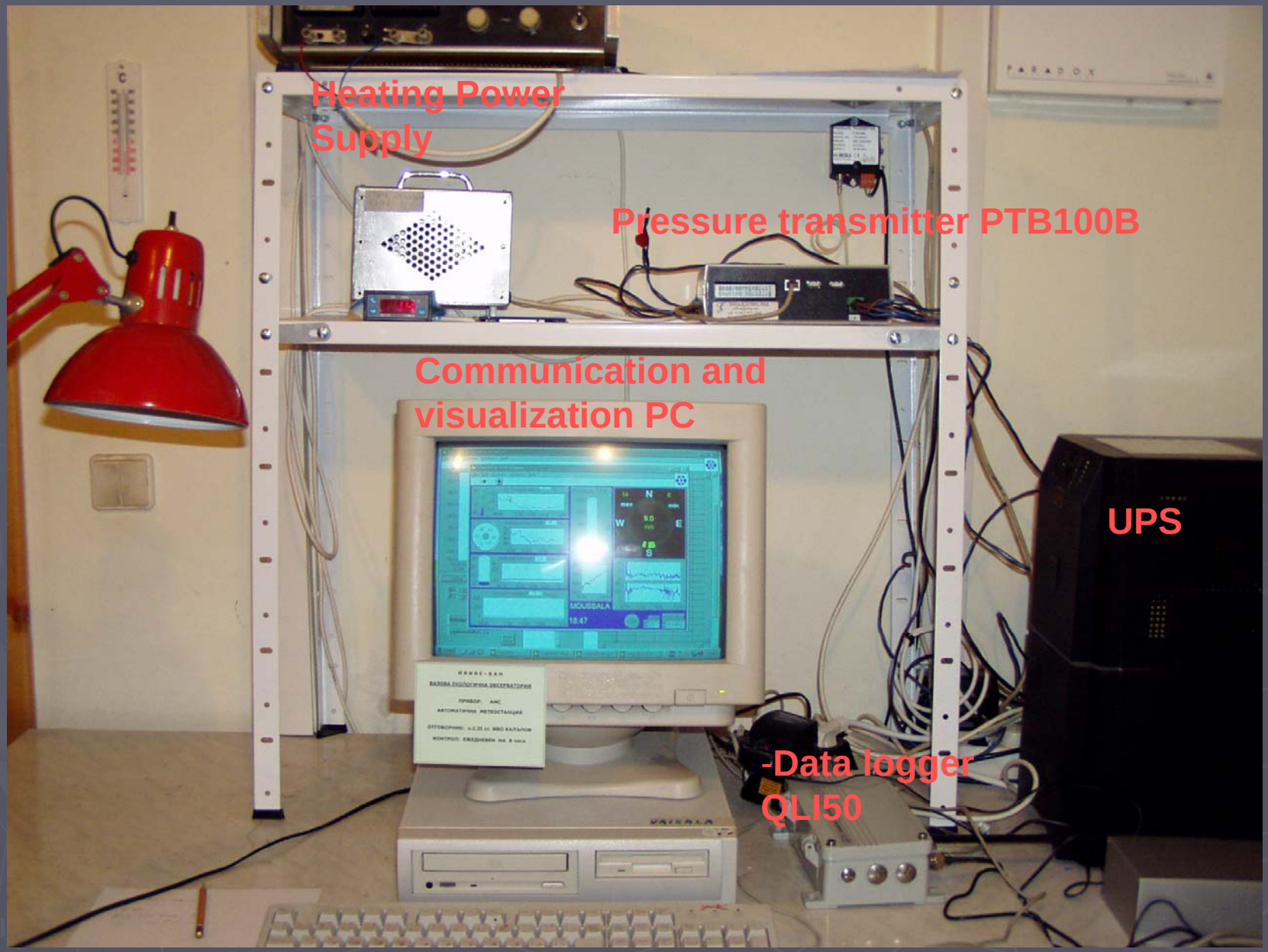
-Temperature and Humidity probe HMP45D

-Pressure transmitter PTB100B

-Wind Sensor WS425

-Precipitation device (Rain gauge!) RG13H

-PC with communication and visualization software.


Heating Power Supply
Pressure transmitter PTB100B
Communication and visualization PC
UPS
-Data logger QLI50

Vaisala WINDCAP® Ultrasonic Wind Sensor WS425 New device

Measures wind speed and direction from the smallest breeze to hurricane force wind (0...56 m/s), including gusts.

Superior data availability and reliability in all wind directions due to the three transducer layout.

Averaging of wind speed and direction.

Analog output,

Low power consumption.

No moving parts: virtually maintenance free

Stainless steel construction

Heated model but not enough for the conditions of peak Moussala


Wind Sensor WS425

Wind speed

Measurement scope:

- analog output.

Starting threshold virtually zero

Resolution 0.1 m/s

Accuracy (range 0...56 m/s) ± 0.135 m/s or 3% of reading, whichever is greater.

Wind direction

Measurement range 0...360°

Starting threshold virtually zero

Resolution 1°

Accuracy (wind speed over 1 m/s) ±2 grad.

New Device

BAROCAP® Analog Barometer PTB100B

- *Long-term stability ±0.1 hPa/year*
- On/off control with external trigger
- Output voltage 0 ... 5 VDC
- Current consumption less than 4 mA
- Accuracy at +20 °C:
  ± 0.5 hPa

HUMICAP® Humidity and Temperature Probe HMP45D

- up to 100 % RH with high accuracy long-term stability in high humidity
- Measurement range
- 40 ... +60 °C Pt 100 IEC 751
- Output - 0...1V
  Output signal resistive 4-wire connection

RG13H Rain Gauge

• tipping-bucket mechanism to produce a contact closure every time it receives a predetermined small quantity of rainfall (0.2 mm).

• aperture of exactly 400 cm
Heater 38 W – improved!
Thermostat operation:
Open at +11 C Close at +4 C

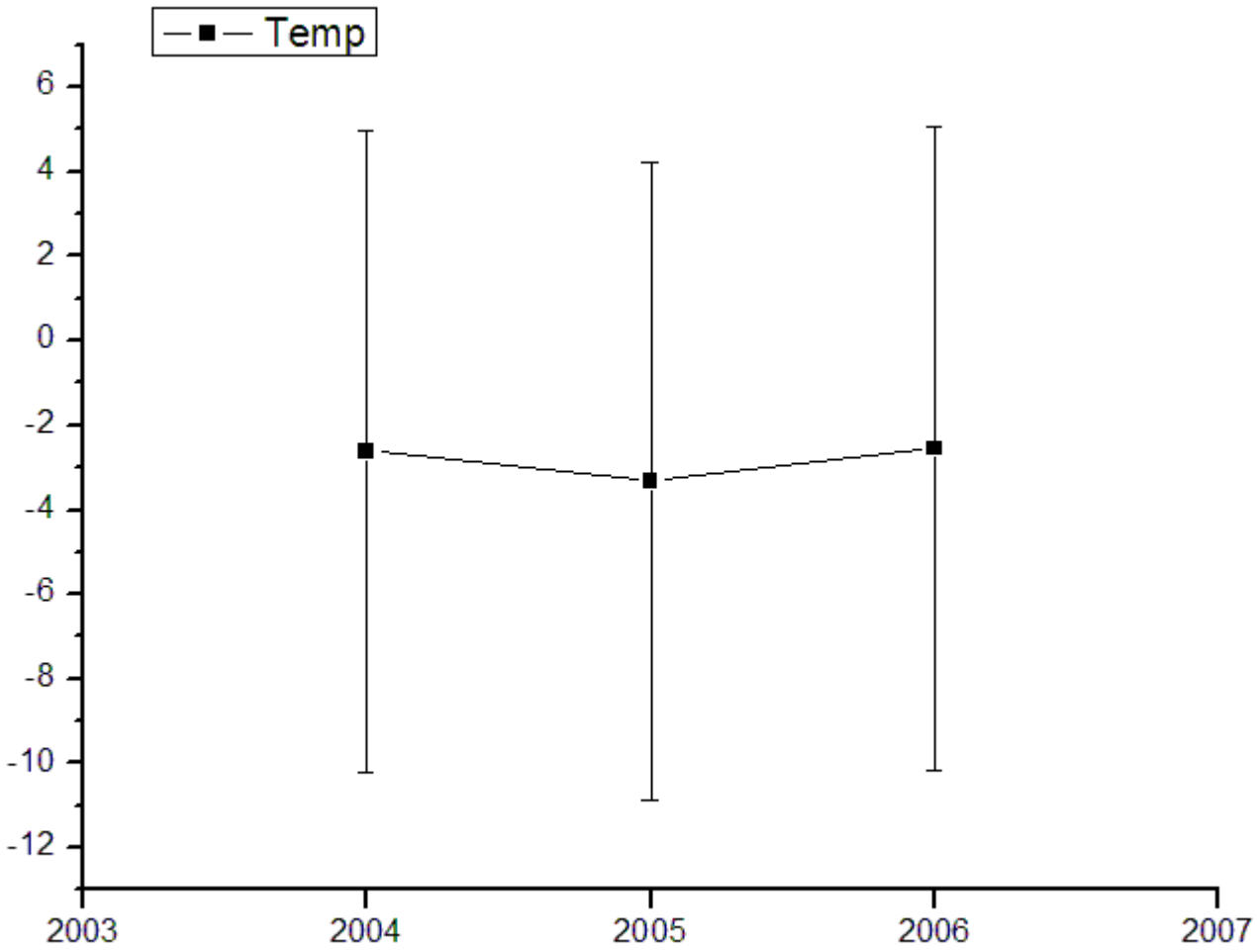
Principles of functioning of Ice Indicator T26 HoloOptics ™(type B)
NEW DEVICE!

The ice indicator comprises of a modulated detector and a synchronized IR emitter, one probe, and a support structure a base plate and cables.
The probe is a reflector that is reflecting the radiation from the emitter back to the detector *if not covered with ice*.
Type B detects al types of rime ice.
If 95-98% of the probe is covered with ice, of the type which it is sensitive - the indicator will indicate the presence of ice. If the part of the probe free of ice is increased to approx. 25 % the indication will stop.
The indicator has an internally controlled probe heating.
The probe heating is turned on and off without time delay.
Heating power is approx. 3W.

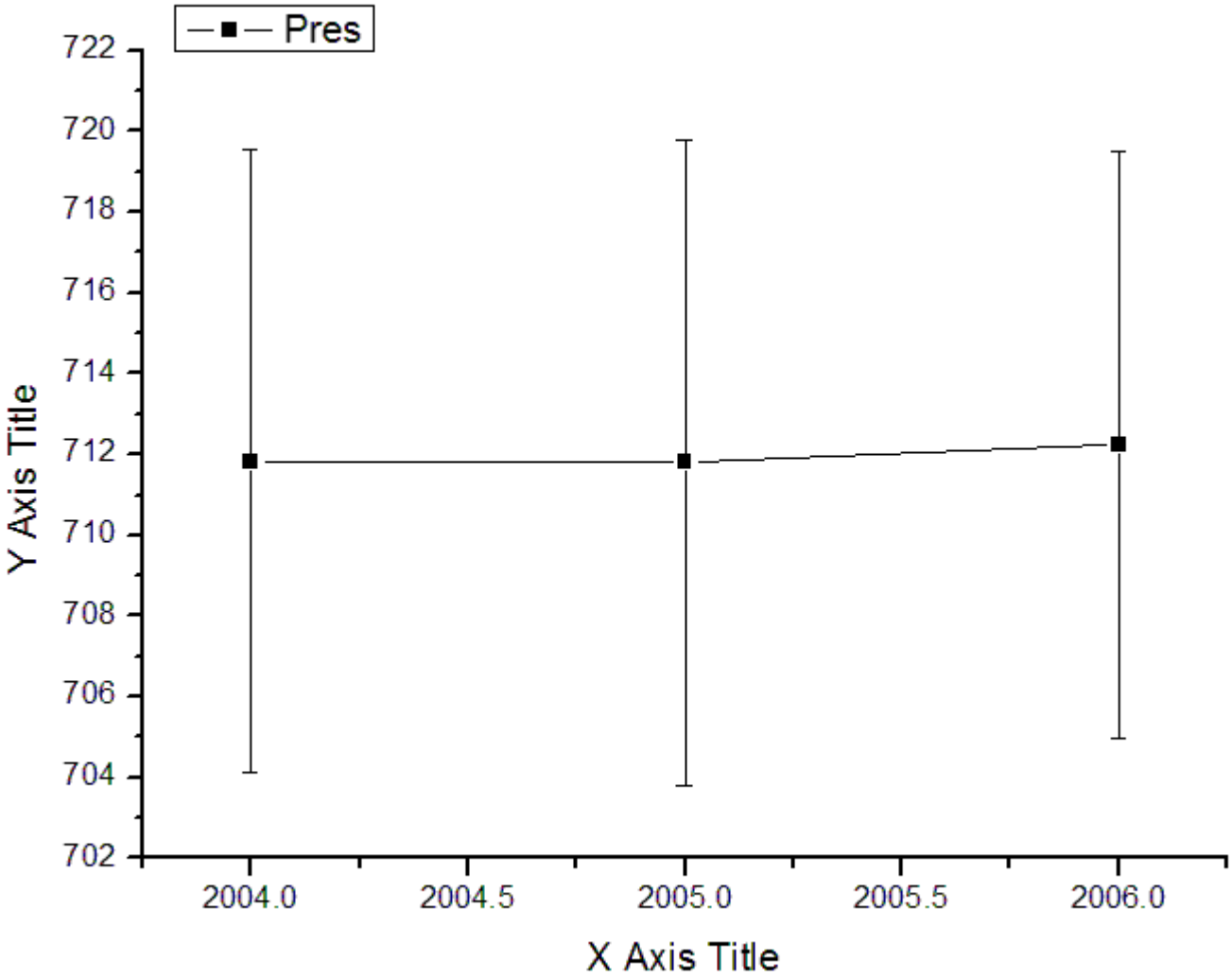
Next slides

Very preliminary statistics for 2004 -2006

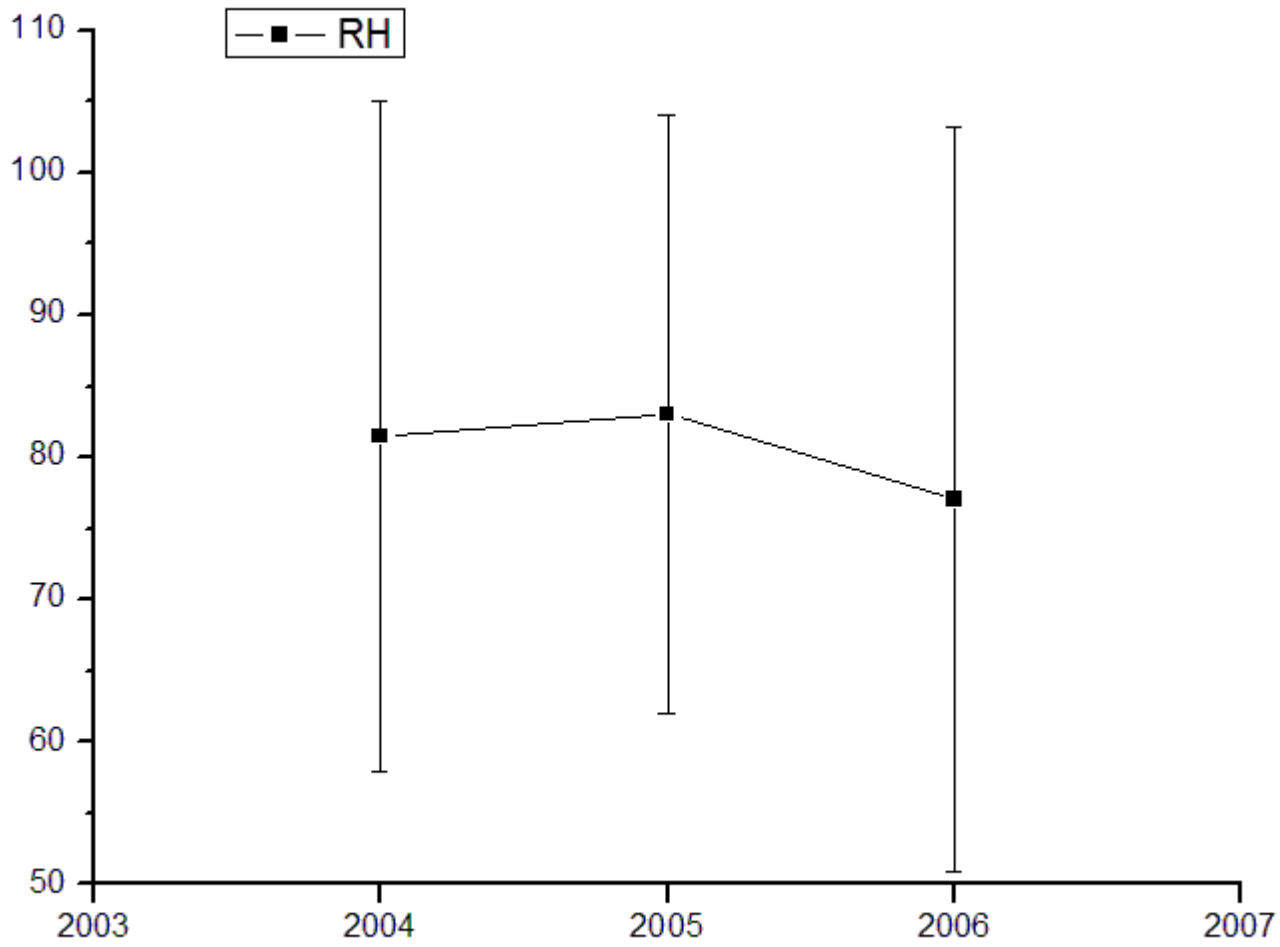
Temperature



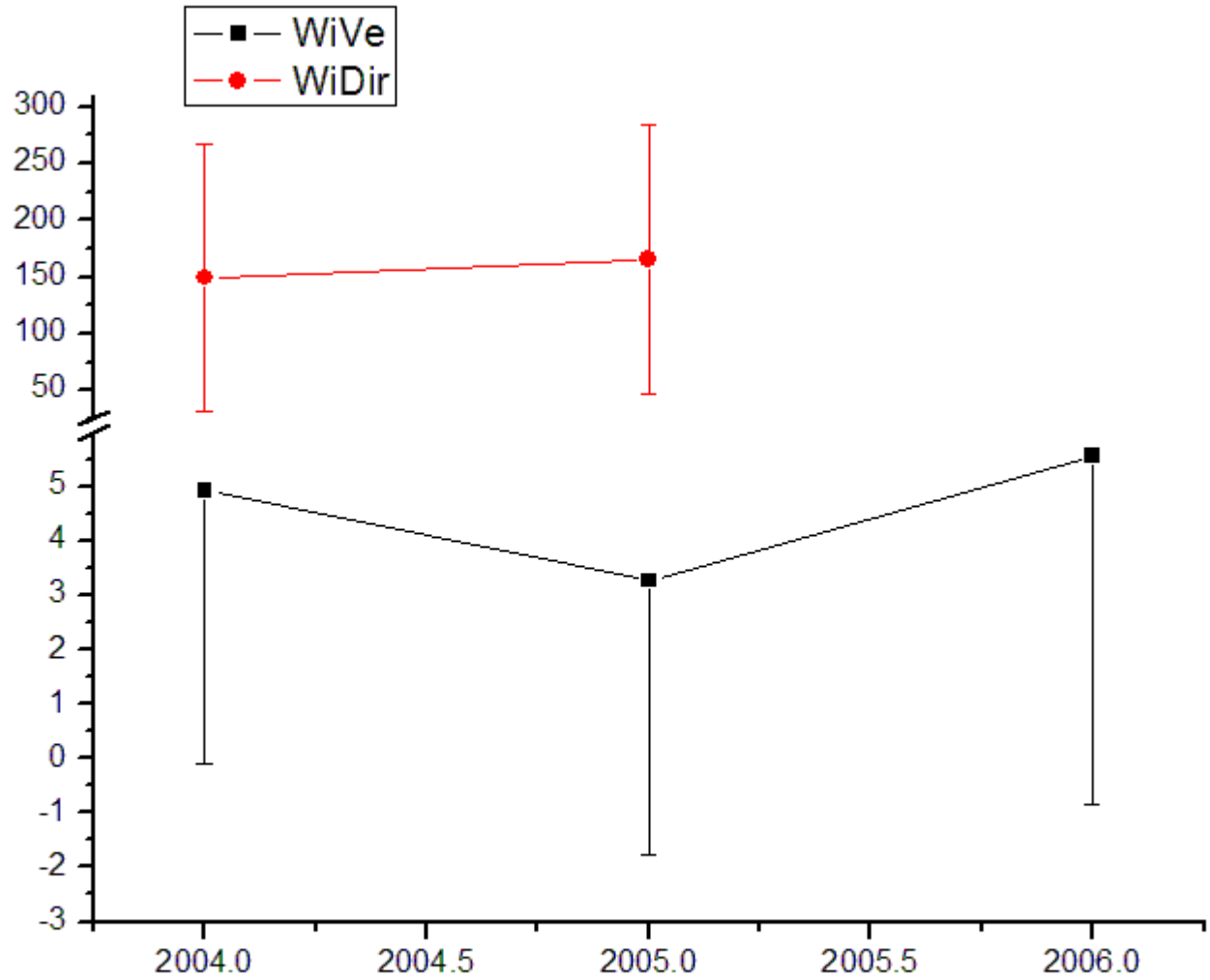
Air Pressure



Relative Humidity



Wind Velocity and Direction



OUR AIMS – CONCLUSION :

- Standard meteorological analysis
- The MORE VALUABLE aim IS to analyze the weather variability: West - North East transport periods, intensity and gradients, season dependences, climate change trends
- To provide data for other devices for proving possible correlations and eventual long range transport.